

Who is experiencing differential impact from HIV/AIDS? Technical notes and data tables

Recent changes to the presentation of Massachusetts HIV/AIDS surveillance data

Effective January 1, 2011, the Massachusetts Department of Public Health (MDPH), Bureau of Infectious Diseases, HIV/AIDS fact sheets, epidemiologic reports and other HIV data presentations have been updated to remove all HIV/AIDS cases who were first diagnosed in another state before being reported in Massachusetts. As of January 1, 2012, this resulted in the removal of 2,924 HIV/AIDS cases, of which 808 have died and 2,116 were living. These persons living with HIV/AIDS may still continue to reside and receive care in the Commonwealth. The total number of persons living with HIV/AIDS, irrespective of location of diagnosis, is the basis for MDPH service planning. This change is partially a result of increased activities required by the Centers for Disease Control and Prevention (CDC) for de-duplication among states in an effort to identify cases that are counted multiple times in the National HIV/AIDS Surveillance System. The cases are assigned to the state that reports the earliest date of AIDS diagnosis if available. If the case has not progressed to AIDS, the case is assigned to the state with the earliest HIV diagnosis date. Please note that all previous HIV/AIDS fact sheets, data reports and presentations include cases that may have been first diagnosed in another state.

Also effective January 1, 2011, the MDPH HIV/AIDS fact sheets, epidemiologic reports, and other data presentations have been updated to eliminate the presumed heterosexual exposure mode category for males; those cases have been reassigned to the no identified risk (NIR) exposure mode category. The presumed heterosexual exposure mode category was used with the intention of identifying HIV exposure mode for females when sex with males is the only reported risk factor, there is no evidence of current or past injection drug use (IDU), and behavioral risk and HIV status information about male sexual partners are unknown. Twenty-nine percent of females living with HIV/AIDS and 40% of recent female HIV diagnoses are reported in the presumed heterosexual exposure mode category. The application of the presumed heterosexual exposure mode category to males is overly inclusive in that female to male HIV transmission is biologically less probable, and there are alternate exposure modes that are possible for males, including sex with other men (MSM) or IDU. The CDC reports males diagnosed with HIV/AIDS who report sex with females as their only risk factor, without corresponding partner risk or HIV status information, in the NIR exposure mode category. This revision to report presumed heterosexual male HIV/AIDS cases as NIR will bring Massachusetts HIV/AIDS case reporting for males in alignment with CDC standards. The MDPH will maintain presumed heterosexual and heterosexual exposure mode categories for females.

Explanation of age adjusted rates

A “rate” of a disease per 100,000 population is a useful way to compare groups that have substantially different population sizes rather than relying on the raw number of cases. For example, the number of people living with HIV/AIDS on December 31, 2011 who are Hispanic/Latino, is 4,341 whereas the number of people living with HIV/AIDS who are white (non-Hispanic) is 7,810. Although the *number* of people living with HIV/AIDS who are Hispanic/Latino in Massachusetts is smaller than the number of people living with HIV/AIDS who are white (non-Hispanic), we also need to consider that there are far fewer people of Hispanic/Latino heritage living in Massachusetts than white (non-Hispanic) individuals. Hispanic/Latino individuals represent 10% of the Massachusetts population compared to white (non-Hispanic) individuals who represent 78% of the population¹. If HIV/AIDS had the same impact on the Hispanic/Latino population of the state as on the white (non-Hispanic), then there should be over 10 times as many cases in white (non-Hispanic) individuals, but there are less than twice as many. By calculating a rate which takes into consideration the differences in the population size, it is evident that the number of people living with HIV/AIDS for every 100,000 Hispanic/Latino individuals in Massachusetts is much higher than the rate for every 100,000 white (non-Hispanic) individuals. This is called a “crude rate” and is calculated by dividing the number of people living with HIV/AIDS by the population of interest (the total number of Hispanic/Latino individuals in Massachusetts, for example) and multiplying by 100,000. (See example 1.A below).

¹ The denominators for rate calculations are from the MDPH Massachusetts Race Allocated Census 2010 Estimates (MRACE 2010), Massachusetts Department of Public Health, Bureau of Health Information, Statistics, Research, and Evaluation.

Example 1.A: Calculation of crude HIV/AIDS prevalence rate for white (non-Hispanic) individuals, Massachusetts (155.2 per 100,000)

$$\begin{aligned}\text{Crude HIV/AIDS prevalence rate for white (non-Hispanic) individuals} &= (\text{number of white (non-Hispanic) individuals living with HIV/AIDS} \div \text{population size of white (non-Hispanic) individuals}) \times 100,000 \\ &= (7,966 / 5,132,633) \times 100,000 \\ &= (0.0015520299) \times 100,000 \\ &= \mathbf{155.2}\end{aligned}$$

However, sometimes, in addition to the population size being different, the age composition of the populations is different. In Massachusetts, black (non-Hispanic) and Hispanic/Latino populations are generally younger than white (non-Hispanic). The median age of black (non-Hispanic) people (29.7 years) and Hispanic/Latino people (24.5 years) is younger than that of white (non-Hispanic) people (38.8 years). Therefore, it is necessary to “age-adjust” the HIV/AIDS prevalence rate to get a true comparison of the impact of the disease across racial/ethnic groups without an effect from the differences in age composition. Age-adjustment of rates minimizes the distortion created by differences in age composition.

Age-adjusted rates are calculated by weighting the age-specific rates for a given population by the age distribution of a standard population. The weighted age-specific rates are then added to produce the adjusted rate for all ages combined. (See example 1.B below).

Example 1.B: Calculation of age-adjusted HIV/AIDS prevalence rate for white (non-Hispanic) individuals, Massachusetts (135.5 per 100,000)

| <i>A</i> | <i>B</i> | <i>C</i> | <i>D</i> | <i>E</i> |
|-----------------------------|--------------------------------------|--------------------------|---|---|
| <i>Age group (in years)</i> | <i># of prevalent HIV/AIDS cases</i> | <i>Population (2010)</i> | <i>2000 US standard population weight</i> | <i>Age-adjusted rate ((B÷C×D)×100,000))</i> |
| <1 | 0 | 48,010 | 0.013818 | 0.00 |
| 1-4 | 0 | 200,452 | 0.055317 | 0.00 |
| 5-14 | 7 | 571,967 | 0.145565 | 0.18 |
| 15-24 | 91 | 677,899 | 0.138646 | 1.86 |
| 25-34 | 474 | 603,245 | 0.135573 | 10.65 |
| 35-44 | 1372 | 676,064 | 0.162613 | 33.00 |
| 45-54 | 3569 | 841,315 | 0.134834 | 57.20 |
| 55-64 | 1942 | 697,852 | 0.087247 | 24.28 |
| 65-74 | 434 | 403,518 | 0.066037 | 7.10 |
| 75-84 | 75 | 275,380 | 0.044842 | 1.22 |
| 85+ years | 2 | 136,931 | 0.015508 | 0.02 |
| Total | 7,966 | 5,132,633 | 1.000000 | 135.5 |

To see the effect of age-distribution on prevalence rates see Tables 1 and 3 below for a comparison of crude and age-adjusted rates by race/ethnicity.

Table 1. Crude and age-adjusted HIV/AIDS prevalence per 100,000 population¹ on December 31, 2011 by race/ethnicity and gender: Massachusetts²

| State Total: | Crude rate per 100,000 | Age-adjusted rate per 100,000 |
|---|-----------------------------------|--|
| White, non-Hispanic | 155.2 | 135.5 |
| Black, non-Hispanic | 1,295.6 | 1,320.6 |
| Hispanic/Latino | 710.6 | 897.2 |
| Asian/Pacific Islander | 79.8 | 81.2 |
| Total prevalence | 277.5 | 257.1 |
| Males: | Crude rate per 100,000 | Age-adjusted rate per 100,000 |
| White, non-Hispanic | 266.0 | 229.4 |
| Black, non-Hispanic | 1,524.7 | 1,581.7 |
| Hispanic/Latino | 971.1 | 1,294.7 |
| Asian/Pacific Islander | 129.0 | 132.5 |
| Total prevalence among males | 408.0 | 373.3 |
| Females: | Crude rate per 100,000 | Age-adjusted rate per 100,000 |
| White, non-Hispanic | 51.7 | 47.0 |
| Black, non-Hispanic | 1,081.7 | 1,095.3 |
| Hispanic/Latina | 459.4 | 553.4 |
| Asian/Pacific Islander | 34.7 | 34.2 |
| Total prevalence among females | 155.4 | 148.5 |
| ¹ The denominators for rate calculations are from the MDPH Massachusetts Race Allocated Census 2010 Estimates (MRACE 2010), Massachusetts Department of Public Health, Bureau of Health Information, Statistics, Research, and Evaluation; all rates are age-adjusted using the 2000 US standard population. ² Effective January 1, 2011, the Massachusetts Department of Public Health, HIV/AIDS fact sheets, epidemiologic reports, and other data presentations have been updated to remove all HIV/AIDS cases that were first diagnosed in another state before being reported in Massachusetts. Data Source: MDPH HIV/AIDS Surveillance Program; Data as of 1/1/12 | | |

Table 2. Age-adjusted HIV/AIDS prevalence rate per 100,000 population¹ on December 31, 2011 by race/ethnicity and Health Service Region (HSR):² Massachusetts³

| | Boston | Central | Metro West | North- east | South- East | Western | State Total |
|---------------------|---------------|----------------|-----------------------|------------------------|------------------------|----------------|------------------------|
| White NH | 608.1 | 80.7 | 91.5 | 103.5 | 119.4 | 85.6 | 135.5 |
| Black NH | 1,447.7 | 1,310.5 | 1,297.5 | 1,345.3 | 856.6 | 901.9 | 1,320.6 |
| Hispanic/ Latino | 910.8 | 851.2 | 530.5 | 639.2 | 891.7 | 1,145.1 | 897.2 |
| API | 137.7 | 73.2 | 38.6 | 115.7 | 77.5 | 91.0 | 81.2 |
| Total | 791.0 | 168.6 | 153.4 | 202.1 | 176.5 | 231.2 | 257.1 |

¹ The denominators for rate calculations are from the MDPH Massachusetts Race Allocated Census 2010 Estimates (MRACE 2010), Massachusetts Department of Public Health, Bureau of Health Information, Statistics, Research, and Evaluation; all rates are age-adjusted using the 2000 US standard population.

² Reflects the health service region of a person's residence at the time of report (not necessarily current residence); See Epidemiologic Profile General Appendices, Health Service Region Maps, available at http://www.mass.gov/dph/aids/research/profile2005/app5_hrs_maps.pdf for configuration of health service regions

³ Effective January 1, 2011, the Massachusetts Department of Public Health, HIV/AIDS fact sheets, epidemiologic reports, and other data presentations have been updated to remove all HIV/AIDS cases that were first diagnosed in another state before being reported in Massachusetts.

⁴ Rates calculated from numerators less than 5 for localities with populations of less than 50,000 are suppressed for the assurance of confidentiality.

NH = non-Hispanic, API = Asian/Pacific Islander

Data Source: MDPH HIV/AIDS Surveillance Program; Data as of 1/1/12

Table 3. Crude and age-adjusted rates of diagnosis of HIV infection per 100,000 population¹ by race/ethnicity and gender: Average annual rate 2008–2010², Massachusetts³

| State total: | Crude rate per 100,000 | Age-adjusted rate per 100,000 |
|---------------------------------|-----------------------------------|--|
| White (non-Hispanic) | 5.0 | 4.9 |
| Black (non-Hispanic) | 52.9 | 53.3 |
| Hispanic/Latino | 26.6 | 30.1 |
| Asian/Pacific Islander | 5.7 | 5.3 |
| Total rate | 10.2 | 10.0 |
| Males: | Crude rate per 100,000 | Age-adjusted rate per 100,000 |
| White (non-Hispanic) | 9.0 | 8.7 |
| Black (non-Hispanic) | 62.3 | 63.2 |
| Hispanic/Latino | 38.1 | 43.9 |
| Asian/Pacific Islander | 9.9 | 9.3 |
| Total rate among males | 15.3 | 14.9 |
| Females: | Crude rate per 100,000 | Age-adjusted rate per 100,000 |
| White (non-Hispanic) | 1.2 | 1.2 |
| Black (non-Hispanic) | 44.1 | 44.4 |
| Hispanic/Latina | 15.4 | 17.5 |
| Asian/Pacific Islander | 1.8 | 1.7 |
| Total rate among females | 5.3 | 5.3 |

¹ The denominators for rate calculations are from the MDPH Massachusetts Race Allocated Census 2010 Estimates (MRACE 2010), Massachusetts Department of Public Health, Bureau of Health Information, Statistics, Research, and Evaluation; all rates are age-adjusted using the 2000 US standard population.

² Reflects year of HIV infection diagnosis among all individuals reported with HIV infection, with or without an AIDS diagnosis for the most recently available three-year period after the implementation of HIV infection reporting in 1999.

³ Effective January 1, 2011, the Massachusetts Department of Public Health, HIV/AIDS fact sheets, epidemiologic reports, and other data presentations have been updated to remove all HIV/AIDS cases that were first diagnosed in another state before being reported in Massachusetts.

Data Source: MDPH HIV/AIDS Surveillance Program; Data as of 1/1/12

Table 4. Age-adjusted rate of HIV diagnosis per 100,000 population¹ by race/ethnicity and Health Service Region (HSR):² Average annual rate 2008–2010,³ Massachusetts⁴

| | Boston | Central | Metro West | North- east | South- East | Western | State Total |
|---------------------|---------------|----------------|-----------------------|------------------------|------------------------|-----------------|------------------------|
| White NH | 16.9 | 2.6 | 3.8 | 3.6 | 4.6 | 4.0 | 4.9 |
| Black NH | 50.6 | 70.9 | 54.1 | 68.5 | 43.9 | 32.3 | 53.3 |
| Hispanic/ Latino | 32.4 | 21.1 | 28.0 | 25.3 | 30.0 | 31.8 | 30.1 |
| API | 4.6 | 6.4 | 3.6 | 9.3 | -- ⁵ | -- ⁵ | 5.3 |
| Total | 24.8 | 6.4 | 7.1 | 8.9 | 7.3 | 8.6 | 10.0 |

¹ The denominators for rate calculations are from the MDPH Massachusetts Race Allocated Census 2010 Estimates (MRACE 2010), Massachusetts Department of Public Health, Bureau of Health Information, Statistics, Research, and Evaluation; all rates are age-adjusted using the 2000 US standard population.

² Reflects the health service region of a person's residence at the time of report (not necessarily current residence); See Epidemiologic Profile General Appendices, Health Service Region Maps, available at http://www.mass.gov/dph/aids/research/profile2005/app5_hrs_maps.pdf for configuration of health service regions

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NH = non-Hispanic, API = Asian/Pacific Islander

Data Source: MDPH HIV/AIDS Surveillance Program, data as of 1/1/12